THE JOHN OLIGER CO.
11601 WHIDBEY DR.
CUMBERLAND, IN 46229

OLIGER 2068 EXPANSION RGB CIRCUIT INSTRUCTIONS

Although this RGB circuit should work with any RGB monitor, these instructions will detail its connection to the Amdek Color II+ monitor simply because this is the particular monitor I chose to purchase. This does not nec. mean that this monitor is the best value around, but just that it is a very popular model and the one I have. If your RGB monitor can be configured to be Apple II compatable, via the use of a switch or other means, then connection to your monitor will be very similar if not identical. If your monitor can only be IBM compatible, then you will need to use the positive sync outputs and to connect its intensity input high (to +5v) rather than gnd to get the correct color yellow.

All the outputs used to connect to your monitor are labeled on the board per the schematic below. Wires are soldered to these "doughnuts", with the wire extending through the board and soldered both on the board's top & bottom. The wires or cable should be brought off the board to the rear, right over the part of the board labeled "clamp". Put a piece of insulation around individual wires at this point if a cable is not used, and use a small piece of solid bare 22AWG wire to form a cable clamp by bending it into a U and inserting it over the cable and into the clamp holes. Solder in place on the board's bottom. The insulation over individual wires will keep the heat of soldering from damaging the board & the clamp itself keeps strain from board movement from breaking off any of the wires from the board in the future. You can use the cable supplied with your monitor for this connection if one was provided-with its computer end connector cut off, or run wires to an appropriate jack.

On the Amdek monitor, remove the small joystick type connector from the cable supplied with your monitor and use the wire colors shown in the schematic to connect your monitor. Configure this Amdek monitor to be Apple II compatible via its internal dip switch per the note provided with your monitor. Now find the "HORZ SIZE" (width) control inside of your Amdek monitor & completely remove its core. You will find that you will need all the width you can muster from your monitor as Timex overcompensated for the overscan normally present in a regular tv reciever by a large reduction in the 2068 video systems width. You CAN get full height via use of the internal vertical size control, but the best in width will still leave about an inch or so of unused screen on both edges. Use the monitor's horz phase and/or horz centering controls to center the display on your monitor.

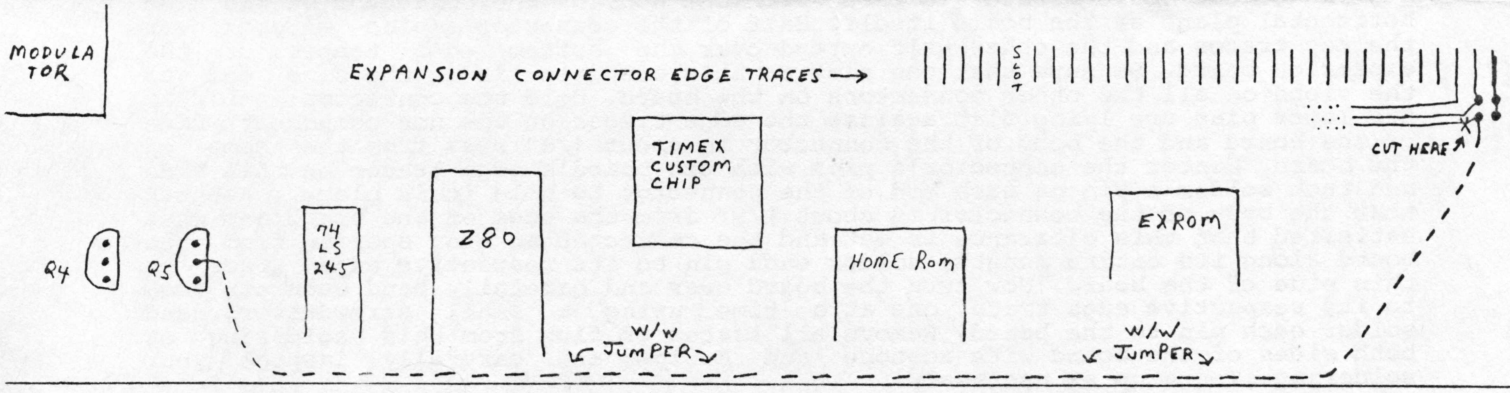
If your particular monitor requires positive sync rather than negative sync, use the pvs & phs outputs on the board instead of the nvs & nhs outputs used for an Apple comp. monitor. You will note that the horz & vert syncs are actually tied together on the board. This is because every RGB monitor I have seen so far is very capeable of seporating the two syncs from each other, so thier external seporation is not only unnec. but a waste and could possibly even cause instabilities!

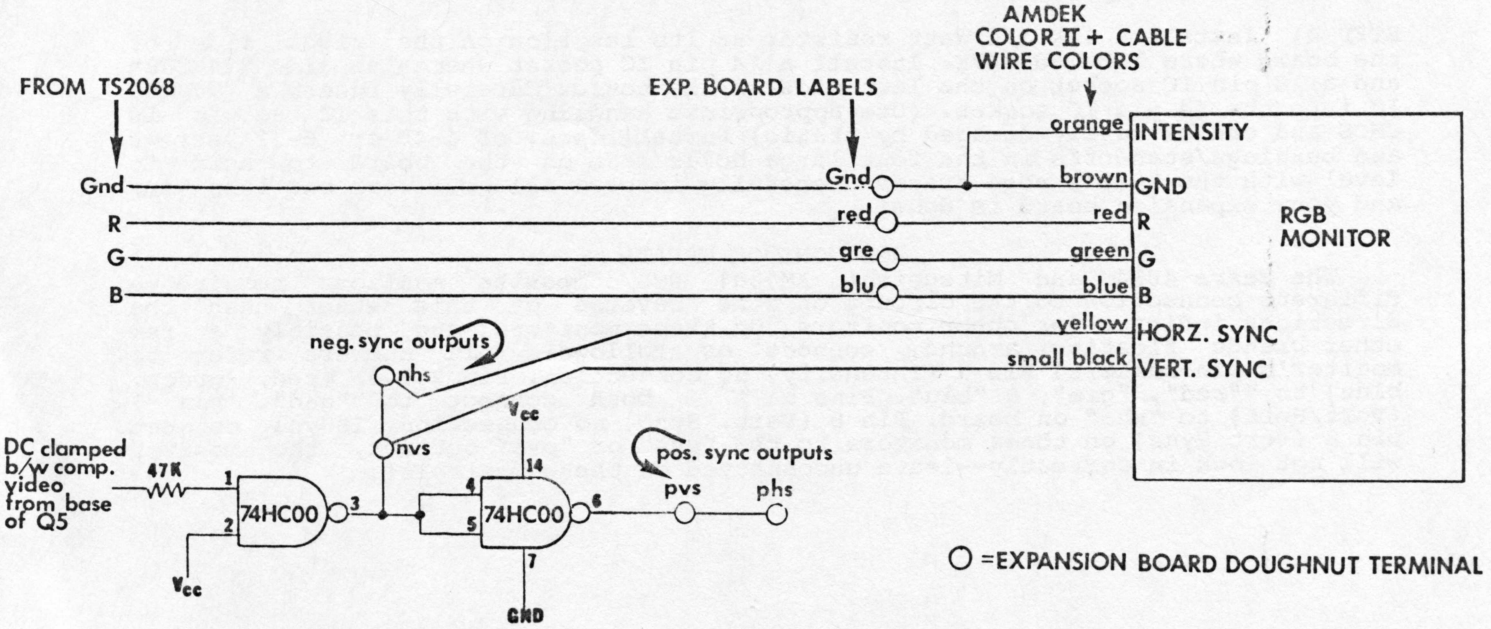
You will also note that the intensity input to your monitor, if it has one, is grounded. This is because I have found no way of deriving an intensity signal from the TS2068 computer. I believe, short of a new and different custom chip, that it cannot be readily done. (Go ahead, prove me wrong!) This only results in the fact that any extra bright areas on the screen show as normal brightness. You will find that this is certainly not much to give up for the new benefits you recieve from your RGB monior.... a BEAUTIFUL crystal clear arcade game quality display with absolutely NO video noise, interference, or crawling dots in the colored areas. You can now see things that you smply couldn't see before with your regular tv or composite monitor!

MODIFY YOUR TS2068 BOARD FOR THE RGB INTERFACE SYNC SEPORATOR AS FOLLOWS:

1) Open your computer by removing the 7 screws from the case's underside, carefully unplug the keyboard flex cable from the pc board and completly remove the top of the case from the computer. Further disassembly is not nec.

2) Cut board trace on far right of computer board where indicated by an "X" below. Use a sharp knife and be careful to only cut this one trace. Install a wire/wrap wire jumper from base (center) terminal of Q5 to feedthrough indicated. Q5 is the unlabeled transistor just to the right of Q4. Carefully check your work in here for shorts & reinstall keyboard cable & case top.





OLIGER CO. 2068 EXPANSION BOARD
ASSEMBLY INSTRUCTIONS

NOTE: ALL parts except the bushings used for this board's "feet" are installed on the side of the board that contains the legend "Made in USA".

STEP 1) If you purchased your Oliger 2068 Expansion Board with its parts kit, you can skip this step and go on to step 2. You will need five 36 position double read out .1" oc soldertail edge connectors. Prepare these connectors for the board by removing the 2nd from the last contact from both sides and both ends of each connector. Use a fine toothed hacksaw to cut both ends of each connector off at the slots just vacated by the pins. Use a fine file to smooth each end and you now have a 32 position edge connector. Further prepare each connector by removing the 6th pin from one end, on both sides. Cut a small piece of plastic or pc board material to fit the "slot" just vacated by these pins and carefully epoxy this "key" into the slot. Set all five connectors aside for the epoxy to dry and take a break.

STEP 2) Insert four of the properly prepared edge connectors through the board from the component side to have its pins extend out the board's solder side at each "SLOT 0 - SLOT 3" location. These connectors can be tricky to insert through the board. Start the connector on one end and while wiggling the connector side to side, slowly work all pins through the board the full length of the connector. After all four connectors are inserted through the board, verify that each connector is at the correct 90 degree angle in relation to the board and as close to the board's surface as possible. Solder the end pins of each end on all connectors to their pads. Use a small pair of diagonal cutters to cut all pins fairly close to the surface of the board and solder all pins in place on each connector. Solder very carefully with a fine tipped soldering pencil and very fine gauge 60/40 rosin core solder, as these pads are very small and surrounded by other pc traces. One short to one of these traces will cause problems and possible damage to your computer, so take your time, use the correct tools, and be very careful. Remove all traces of flux from soldering and very carefully inspect your work. Look for dull colored solder joints and fine solder bridges to adjacent traces. Touch up anything found that looks suspicious in the least.

STEP 3) Install the last edge connector as follows: This connector installs on the end of the board marked "To 2068" with the body of the connector on the same horizontal plane as the board itself. Half of the connector's pins extend over the top traces and the other half extend over the bottom edge traces of the expansion board. Be sure that the slot on this connector is on the same end as the slots on all the other connectors on the board. Hold the connector so that its lower pins are lying flat against the edge traces on the non-component side of the board and the body of the connector is about 1/8" away from the edge of the board. Center the connector's pins with the board's edge traces on this side and tack solder a pin on each end of the connector to hold it in place. Recheck that the body of the connector is about 1/8" from the edge of the board and when satisfied that this clearance is met and the connector an even spacing from the board along its entire length, solder each pin to its respective edge trace on this side of the board. Now turn the board over and carefully bend each pin down to its respective edge trace, one at a time using a small screwdriver, and solder each pin to the board. Remove all traces of flux from this soldering on both sides of the board with acetone and Q-tips and carefully inspect your soldering. Touch up as necessary.

STEP 4) Install a 47K 1/4 Watt resistor at its location on the right side of the board where labeled R47K. Install a 14 pin IC socket where labeled "74HC00" and a 20 pin IC socket on the left side of the board. Carefully insert a 74HC00 IC into the 14 pin IC socket. (Use appropriate handling with this IC as it is CMOS and can be easily damaged by static) Install 4pcs. of 4-40 or 6-32 screws and bushings/standoffs in the four large holes left on the board to hold it level with the 2068's edge traces. Carefully inspect all your work one last time and your expansion board is done!

RGB MONITOR ERRATA

The Sears 4084 and Mitsubishi AM1301 RGB/composite monitors require a different connection to the circuit on the reverse of this sheet than the directions indicate for other monitors. On these monitors, and possibly a few other brands floating around, connect as follows: (pin numbers refer to monitor's pin numbers) Pin 1 (Intensity) no connection. Pin 2,3,4 (red, green, blue) to ""red", "gre", & "blu". Pins 5 & 6 both connect to "gnd". Pin 7 (Vert/Horz) to "nhs" on board. Pin 8 (Vert. Sync) no connection. If you connect pin 8 (Vert Sync) on these monitors to the "nvs" or "pvs" outputs, the monitor will not lock in correctly--leave unconnected on these monitors!

Wiring RGB Cables

by Philip Chien

Composite video monitors are very easy to hook up to most computers. Just go to your local Radio Shack or stereo store and pick up an $1 RCA-RCA cable. Connect one end to the monitor, and the other to the computer, turn both on, and you'll have a picture on the monitor. Simple.

Unfortunately composite video has its limitations. Since the video, sync, and 3.58 Mhz color burst frequency are combined together into one signal the bandwidth of a composite video signal is fairly limited. NTSC (Never Twice the Same Color) video has its roots back to the original US television sets of the 1930s, and is rather crude in comparison with state of the art high definition television sets. A black and white composite monitor can handle an 80 column line without any problems, but if you want a color display, you are limited to a 40 column display.

RGB monitors solve many of the limitations of the composite video display. An RGB monitor has no problems displaying an 80 column display, with color text and graphics combined. Text and graphics are very fine and clean on an RGB monitor. RGB does its magic by sending separate signals for each of the three primary colors of light; Red, Green, and Blue. An optional Intensity signal may also be available doubling the possible colors from eight to sixteen.

RGB is much more complicated than composite video. Most computers don't have built in RGB ports, the ports must be purchased as an option, often from a third party supplier. Almost all computers, except those designed for use primarily as video games, can be upgraded with RGB ports, but there are a variety of different "standards."

Four or five signals are needed for most RGB setups. Quite obviously the most important signals are the R G and B signals (Red, Green, and Blue). A Sync signal is also required, and it can be provided in a variety of different methods. Some older computers combine the sync signal with the green signal, some computers provide a composite signal, others provide separate Horizontal and Vertical sync signals. To make matters more confusing, the sync can either be positive or negative polarity. The final signal, which is not always used, is an intensity signal. The intensity sets the light level (gray mix) of the colors. If your computer produces this signal, and the monitor can accept it, then you can display two intensity (brightness) levels of video. The Intensity signal is optional, if either your computer or monitor doesn't provide the intensity signal then you will be limited to eight colors. If both your computer and monitor handle the Intensity signal then you can produce up to sixteen colors. Diagram #1 shows how the three colors are mixed together to produce the eight standard RGB colors and how the Intensity signal can be added to produce a set of eight more shades of color.

The first popular computer to include an RGB port was the Apple III, way back in 1980 (Yes Virginia, the Apple III was popular. When Apple Computer cancelled production, it was the sixth largest selling computer—and well ahead of the Macintosh which it competed with within Apple). Unfortunately very few RGB monitors were available in 1980, and the few which were available were studio quality monitors which sold for over $1000 (really!).

Apple IIIs produce a Digital RGB signal on the DB-15 video port which can be used directly with many RGB monitors. The Apple III owners manual includes a resistor network circuit which changes the digital signal into an analog signal.

continued on page 152

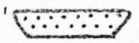
Diagram #1: Combining colors

Red	Green	Blue	Intensity	Results
				Black
x				Dark Red
	x			Dark Green
		x		Dark Blue
x	x			Dark Yellow / Brown (see text)
x		x		Dark Magenta
	x	x		Dark Cyan
x	x	x		White
			x	Gray
x			x	Light Red
	x		x	Light Green
		x	x	Light Blue
x	x		x	Light Yellow
x		x	x	Light Magenta
	x	x	x	Light Cyan
x	x	x	x	Bright White

Diagram #2: Three typical connectors used by RGB monitors

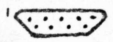
DB-15 connector
(Apple III. Other Apples don't have the voltage, or NTSC signals)

1 Shield GND	6 GND	11 (B&W NTSC Video)
2 Green	7 (-5 volts)	12 (Color NTSC Video)
3 Sync	8 (+12 volts	13 GND
4 NC	9 Blue	14 (-12 volts)
5 Red	10 Intensity	15 (+5 volts)



DB-9 connector

1 Shield GND	4 Green	7 NC
2 GND	5 Blue	8 H sync
3 Red	6 Intensity	9 V sync



EIAJ-8 connector

1 Intensity	5 Shield GND
2 Red	6 GND
3 Green	7 H sync or composite sync
4 Blue	8 V sync

Diagram #3: Three typical cables

DB-9 to EIAJ-8 (e.g. IBM or compatible to Taxan or component TV)

1 —— 5	GND
2 —— 6	GND
3 —— 2	Red
4 —— 3	Green
5 —— 4	Blue
6 —— 1	Intensity
8 —— 7	H sync
9 —— 8	V sync
7	No Connection

DB-15 to EIAJ-8 (e.g. Apple to Taxan or component TV)

1 —— 5	GND
2 —— 3	Green
3 —— 7	Composite Sync
5 —— 2	Red
6 —— 6	GND
9 —— 4	Blue
10 —— 1	Intensity

(other pins no connection)

DB-15 to DB-9 (e.g. Apple to IBM compatible monitor)

1 —— 1	GND
2 —— 4	Green
3 —— 8	H Sync
9	V Sync
5 —— 3	Red
6 —— 2	GND
9 —— 5	Blue
10 —— 6	Intensity

(other pins no connection)